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AND CANYON
OF ARIZONA

THROUGH
THE STEREOSCOPE

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The Grand Cañon of Arizona :: ::

THROUGH THE STEREOSCOPE

The Underwood Patent Map
System combined with eight-
een original stereoscopic pho-
tographs

Explanatory Notes edited by
S. S. Deffenbaugh

Author of

The Romance of the Colorado River,
North Americans of Yesterday, etc.



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LOOKING THROUGH STEREO- GRAPHS

Stereoscopic photographs or stereographs are not just "little pictures." When a stereograph is held in the hand and looked at with the unaided eye it seems to the inexperienced observer like a pair of photographs just alike, mounted side by side on one card. The fact is that the two parts are *not* alike—the negatives were taken at the same instant, but with two different lenses, set side by side in the camera about as far apart as a man's two eyes.

Now a man's two eyes do not give him exactly duplicate reports in regard to any solid object at which he looks. You can easily prove this for yourself. Stretch out your own right arm at full length exactly in front of you, so that the outspread hand is seen edge-wise opposite your face. Close the left eye and look only with the right; you see the edge of your hand and a bit around on the back of your hand. Keep the position unchanged, but close the right eye and look only with the left; this time you see the edge and a part of the palm. Now look

with both eyes at once. You will see with the right eye a part of the right side, with the left a part of the left side; the result is that you will practically see *part way around the hand*, and that is what makes it look solid rather than flat or like a mere shadow on paper.

Stereoscopic photography is based on this principle of two-eye vision. One lens of the stereoscopic camera takes in just what a man's right eye would see if he occupied the camera's place. The other lens takes in exactly what the man's left eye would see at the same instant. When the two resulting prints are placed before the oblique-set lenses of the stereoscope, the impressions they give are combined into one. You see everything standing out solid with space around it, exactly as you would see it if you were bodily present on the spot, lacking only the element of color.

Try one more experiment to see how much difference there is between an ordinary "picture," such as can be taken with one lens and seen with one eye, and a stereograph of the same place. Find No. 17 in this series—"Overlooking Nature's greatest amphitheatre." Cover one side with your hand or with this book, and look at the other side, not using the stereoscope. It is interesting

—yes, that scenery must be grand, so you say. Now place the stereograph in the rack, adjust it at the proper distance for your eyes and look at it through the stereoscopic lenses. Does it not make you almost draw back with a shock of surprise? You feel the dizzy space below that perilously overhanging shelf, from which the men are looking off; you almost hold your breath as you peer down towards the invisible bottom of the gorge.

The difference between a mere picture and a stereograph is probably clear to you now.

It seems to some people too wonderful for belief that stereographs should give them the impression of everything in the full size of the actual, existing world, yet this also is true. Look out from your own window, six or eight feet distant, at a man in the street forty feet away; how much space on the window-glass is actually occupied by his figure? Only a fraction of an inch! A visiting card held in your own hand at arm's length might easily cover him from sight. That same small card might cover a tall building, or even hide a distant mountain, for a small thing near the eyes naturally fills the same space as a much larger thing farther away. This fact of optics has

also to do with the service rendered by stereographs, for the stereoscopic prints, when viewed through the oblique, set lenses of the stereoscope, become like so many *windows through which you can see the real things*, full size, off at the distance where they actually were in fact, when confronted by the sensitized plates of the camera.

The mechanical construction of the stereoscope in itself helps one to see everything in full size with the effect of real presence on the spot. The hood which fits against the forehead, shutting off as it does all sight of the things directly surrounding you as you sit in your own chair, makes it much easier for you to forget that chair and the floor and the walls of your room—to think only of the other place at which you are looking, and to feel yourself actually there on the spot.

But in order to have a thoroughly satisfactory sense of location on the spot you must know where “there” is; lacking such knowledge you still remain in the helpless condition of a man who has been carried somewhere blindfolded or asleep and who opens his eyes on a place whose identity is unknown. To meet the need in this line you will find the special, patent maps included in this pamphlet quite invaluable. *Do not fail to study*

the maps; it will repay you tenfold for the slight exertion. The encircled figures in red show exactly where you are standing in each case. The red lines diverging V fashion from these points show in what direction you are looking.

You will find it well worth all the trouble it costs to pause at each standpoint and think definitely just where you are and not only what is before you, but also (wherever possible) what is behind you, and what lies off at your left and your right beyond the limits of your actual vision. This aids immensely if you want really to enter into the spirit of the place in question. If you take pains to do all this, you can certainly obtain a considerable measure of the very same feelings that you would have if you were bodily on the spot—the difference will be only as to the degree and intensity of feeling, not in regard to the kind of feeling.

Do not hurry. Tourists often lose half the meaning and half the pleasure of a journey because of their nervous way of scampering from one sight to another without stopping to think about what they see. To some extent this mistake can hardly be avoided when stages and trains start at certain moments and excursion tickets have limited dates. But when you are looking at the country through stere-

ographs, you can take your time about it. You can linger long enough in any one spot so that the beauty and the meaning of what you see may be mentally digested. Best of all, you can keep going over and over again to any place which makes a particularly strong appeal to you ; you can gradually grow as familiar with it as if it were close by your home.

HOW THE CAÑON CAME TO BE

A full account of the geologic history of the Cañon would fill several bulky volumes, but this is the story in brief.

Ages upon ages ago, before the cooling crust that makes the earth's surface was nearly as thick as it is now, a portion of it, including northern Arizona, did not stand at this present high level; it was lower by several thousand feet, so low in fact, that the waters of the sea had found and filled its deep hollow. For ages and ages the bare lands around it were subjected to the wear and tear of primeval storms and floods, and nameless rivers bore their waste down to this part of the sea in the form of sand and gravel. Through immeasurably long periods the old ocean-bed kept accumulating layer after layer of sediment so deposited.

Then, after a time, some disturbance within the fiery interior of the earth led to a change in this part of its surface, pushing it outward—*i.e.* upward—and transforming the one time ocean-bed into dry land. The effect of the enormous weight of the superimposed masses of sediment, combined with the effect of

heat from below, had compacted and hardened the ancient layers of ocean mud and transformed them into solid strata of rock. When these rock-strata were pushed up by volcanic forces from the interior, some of them were broken apart and tilted into other than horizontal positions. So exposed and, in parts, so broken, the stratified rocks took their turn at being weathered and worn away by river currents that tore along over them.

Still later (there is ample ocular evidence for all this in the geologist's eyes), some further seismic disturbance caused all this region to settle again, sinking once more below ocean-level and becoming re-flooded by prehistoric seas. Again it lay below the waters, receiving tribute of sedimentary deposits, this time not merely of inorganic rock-waste, but also of soil, for land vegetation was flourishing rankly under new climatic conditions.

And yet all this was but a preliminary part of the experience of this portion of the earth's surface.

A second time this part of the still yielding crust was readjusted as the result of interior pressure, being pushed up and out till its bulging brought it again above the sea-level, and it played for a second time the rôle of dry land. When it thus rose again, its latest acquisitions in the

form of sedimentary linings had become compressed and hardened into stratified rock, just as was the case with the earlier deposits, though the material compressed was distinctly different in character.

A huge inland sea above spilled over during these changes of level. Its waters, hurrying down to the main ocean, wore a channel in the rock-surfaces over which they flowed. The corrasive floods, loaded with sharp fragments of gravelly sediment, were great and strong; they cut their way deeper and deeper as they were pushed to their work by other floods that crowded fast upon them from behind. All this time while the pouring, tearing, raging outlet of the inland sea was wearing gorges through the rocks, the plateau as a whole was rising, and the corrading stream, acquiring still greater momentum and cutting power, sawed away at the rocks that steadily rose against its blade. It cut deeper and deeper and deeper, while the forces of erosion attacked the side walls. Century after century, the cutting went on; sometimes the upward push of the rocky surface lessened for a while; again it increased. Now and again the down-pouring river met with more resistance in some section of its banks of stone, and particularly stubborn cores of ancient rock were left only par-

tially cut away, the river not having had quite time enough to conquer them before its watery ammunition began to fail. Those obstinate remnants, all cut and carved by the long continued persistence of the waters are what are known to-day as buttes, projecting from the jagged walls of the ancient gorge.

During the great glacial period the general topography of this region must have been approximately the same as now, and the floods fed by the melting ice fields of the mountain tops must have kept this huge river-bed full of roaring waters. Tributary streams having their chief development during the ice age, are credited with much of the carving of the side cañons; certainly there is not now a volume of water commensurate with the present magnitude of their sculptured gorges, though time is long and erosion unceasing.

Dellenbaugh* says: "The Grand Cañon may be likened to an inverted mountain range. Imagine a great mountain chain cast upside down in plaster. Then all the former edges and spurs of the range become tributary canyons and gulches running back twenty or thirty miles into the surrounding country,

* F. S. Dellenbaugh: *Romance of the Colorado River*, p. 40.

growing shallower and shallower as the distance increases from the central core, just as the great spurs and ridges of a mountain range, descending, melt finally into the plain."

The inland sea whose outlet probably began the stupendous gorges of this river is no longer in existence. The vast northern ice-fields, whose melting deepened it with their summer freshets, are a thing of the far-distant past. Only the melting snows and pouring rains of the Rocky Mountain region between here and Yellowstone Park now contribute to the stream whose far-back ancestors did such mighty execution. The Colorado River of to-day, the marriage of the Green and the Grand, is, however, no ignoble stream. Fremont's Peak, where the Green River begins, stands 13,790 feet above sea-level; the river flows two thousand miles, from the Wind River mountains in northwestern Wyoming to the Gulf of California; and it drains an area equal to that of Minnesota, Wisconsin, Illinois, Iowa and Missouri. Here in the Cañon it is from one to five or six hundred feet wide; its current is of terrific swiftness and great depth; yet, with all its noble dimensions, it is only a playful infant in comparison with the ancestral floods that tore out this stupendous chasm

on their stern and ferocious progress down to the Peaceful Sea!

The great width of the outer cañon from rim to rim (in several places twelve to fourteen miles) is, of course, due in part to the action of rain, frost and wind (the forces of erosion), as well as to the work of running water (the force of corrasion). In some places currents of water wore away softer strata low down in the bounding walls, and in the course of time so under-cut the more obstinate upper strata that the latter were dragged down by their own weight, tearing huge sections out of the walls and thus widening the river bed as a whole.

Figures taken by themselves mean little, but kept in mind when one is seeing the facts, mean a great deal.

Where the Little Colorado enters, some fifteen miles above Bissell's Point, the present bed of the stream is 2,690 feet above sea-level. Through the granite gorge below Hance's Point and the Grand View Trail, it lowers rapidly, in one stretch of ten miles falling 210 feet. At the junction of the Kanab, below the best known part of the Cañon, the river bed is only 1,800 feet above the sea, *i.e.*, it falls 890 feet during its journey from the Little Colorado to the Kanab. The average depth of the entire gorge is over 4,000

feet; at Hance's Cove and several other points the actual vertical depth reaches nearly 6,000 feet; the cut of the river below Hance's Cove lays bare successive strata of rock representing successively older and older geologic ages, and goes down through all those enwrapping layers of the earth's surface to the inner core of the globe—metamorphic rock, the primeval stuff of the world.

C. E. Dutton,* author of the chief Government documents regarding the geology of the Cañon, enumerates the rock-strata laid bare—beginning at the rim—as follows:

1. Cherty limestone, 240 feet.
2. Upper Aubrey limestone, 320 feet.
3. Cross-bedded sandstone, 380 feet.
4. Lower Aubrey sandstone, 950 feet.
5. Upper red-wall sandstone, 400 feet.
6. Red-wall limestone, 1,500 feet.
7. Lower carboniferous sandstone, 550 feet.
8. Quartzite base of Carboniferous, 180 feet.
9. Archæan.

* C. E. Dutton: *Tertiary History of the Grand Canyon District.*

The Physical Geology of the Grand Canyon District.

HOW THE CAÑON WAS EXPLORED

In comparison with the long ages which it took to make the Cañon, men's acquaintance with it is all very brief; and yet even that began longer ago than history can reach. In a gulch a little way above Bright Angel Creek there are ruins of stone houses, built evidently by Indians, akin to those who now build similar homes over on the mesas of the Painted Desert in the northeastern part of the State. At Moran Point there are remains of curious old stone dwellings, evidently the abandoned homes of a similar tribe. Remains of the same kind exist in various parts of the bottom of the Grand Cañon, and may be discovered along the northern rim and in the side cañons. They are also found in all the other cañons of the Colorado, above. Down in the deep gorge of Havasupai Creek, a tributary of the Grand Cañon, eleven miles at the west, the Havasupais live to-day. It is difficult to assign any definite date to the abandoned stone houses down inside the cañon, but it seems probable that the Indians went to live in such nearly inaccessible spots chiefly as a means of

self-protection against enemies. Their migration here may have been caused by inter-tribal feuds, or it may have been partly a consequence of northward movements on the part of the Spanish conquerors of southern and central Mexico. (All this region, it will be remembered, was until 1848 a part of Mexico.) About 1530 it is certain that the Spanish had been told great tales about the existence of rich towns somewhere up here full of treasures worth capture. It was in 1540 that an exploring party, under Coronado, sent by the Spanish viceroy Mendoza, reached certain Indian villages about twenty days' journey from here, and the natives took them to see what the Spanish captain, Cardenas,* afterwards described as a marvellous river-gorge. The accounts of the journey are so meagre and vague that it is impossible to be sure just where the Spaniards got their first sight of the world's wonder; some authorities think it was not far from the head of the present Bright Angel Trail (see stereograph 15); some think it must have been considerably farther down-river.† When the expedition went back

* George Parker Winship: *The Journey of Coronado* p. 35.

† F. S. Dellenbaugh: *The Romance of the Colorado River*, Ch. II.

to Mexico, it was reported that a river had been seen with banks three or four leagues apart, and with queerly shaped buttes in the bank taller than the great tower of Seville; a river with walls so deep that the current, half a league wide, looked like a mere brook in the distance below. It was a marvellous story and, no doubt, found ready listeners; but the Spaniards were more interested in gold and silver than in scenery, and they allowed the travellers' tale to die into mere tradition, interesting enough, but to them not especially worth while.

The next white people to see the cañon were some of the Franciscan priests who came out in the wilderness from Mexico, to find where the Indians lived between the Rio Grande settlements and in California, and to bring them the message of the Christian religion. In 1776, Father Garces visited the Havasupais and then went on across the desert plateau south of the Grand Cañon, climbed down and up the steeps of the cañon of the Little Colorado and went off northeast across the Painted Desert to Oraibi.

He did not get a good look into the depths of the larger cañon, but he did record in his diary of the Little Colorado: "The bed of this river as far as the confluence is a trough of solid rock, very

profound, and wide about a stone's throw."

Later in the same year another Franciscan father named Escalante endeavored to explore a route to the Mission of Monterey from Santa Fé. He led his party north, almost to the shore of Salt Lake, then turned southwest about as far as the present town of St. George. Fearing Monterey could not be reached before winter set in, he turned east and attempted to cross the Colorado. The grandeur of the gorges in that part of the river was tragic for the Padre's expedition; twelve days they wandered along the edges of giant cliffs, painfully crawling down and wearily dragging themselves up again till their provisions were exhausted and they were forced to eat some of their worn-out horses. They succeeded finally in crossing about thirty-five miles above Lee Ferry—as the river runs—about fourteen in a straight line.

After the famous Lewis-and-Clark expedition from St. Louis to the mouth of the Columbia in 1804-6, hunters and trappers began to push out into the wilderness in this direction. In 1826, a party of trappers under a leader named Pattie came across-country from the Gila River, reached the Grand Cañon at its foot, and followed along near the rim for

a considerable distance. Pattie afterwards wrote an account of the journey, giving his impressions of the river-rim as "horrid mountains which so cage it up as to deprive all human beings of the ability to descend its banks and make use of its waters. No mortal has the power," so he said, "of describing the pleasure I felt when I could once more reach the banks of the river."

In Fremont's time, when much of the West was scientifically examined, the Grand Cañon was still known only by hazy and terrifying report. Three parties had, indeed, attempted to descend the upper river in boats, but their expeditions met with disaster. Fremont himself, with all his daring, was satisfied merely to look at some of the upper cañons (above the confluence of the Yampa) from the rim, and reported "the country below is said to assume a very rugged character, the river and its affluents passing through cañons which forbid all access to the water."

It was not until 1869 that white men actually passed through the fearful deeps of the Grand Cañon and lived to tell the tale. Major John W. Powell, a veteran of the Civil War, organized and successfully carried through the first serious scientific attempt to explore the awful

gorge on the river-waters.* He had four boats specially built for the expedition, each planned with water-tight compartments and, while as strong as possible, light enough to be carried by four men. Ten men made up his party. They took with them provisions for ten months, but expected to be absent much longer, intending to add to this stock by killing game along the way. Clothing, ammunition, tools and a good equipment of instruments for making scientific observations, sextants, compasses, barometers, thermometers, etc., were also carried. The cargo was carefully divided between the boats in such a way that no essential item would be entirely lost if any particular boat should be wrecked.

Funds for the expedition were furnished by the Illinois Industrial University and the Chicago Academy of Sciences. The boats started from the little station of the Union Pacific Railroad where the tracks cross Green River.

An old Indian told them of the experience of one of his tribe in attempting to pass through one of the cañons in a canoe: "Rocks h-e-a-p h-e-a-p high;

* Major Powell was the founder of the Bureau of American Ethnology and director until his death in 1902. He was also for many years director of the United States Geological Survey.

water go h-oo-woogh; h-oo-woogh; water-pony heap buck; water catch 'em; no see 'em Injun any more! No see um squaw any more; no see um papoose any more!" Thus the whole family was wiped out.

It was an awesome experience, not only full of definite, explicit dangers to be battled with in sternly practical fashion, day after day, but also colored deep with a sense of mystery. To-day the actual perils of rocks and rapids would be just the same, but at least a voyager would have maps and charts to refer to; he would know what he might expect to find around the next turn in the channel. But, when Powell and his men went through in 1869, they had absolutely no certain knowledge of what perils might at any hour lie before them. Shooting swift rapids away down at the bottom of a narrow gorge, where they had to look up a vertical mile to see the edge of the precipitous banks towering over their heads, anything might be lying in wait for them at the next bend in the stream. It might any hour come about that they would reach a place where the falls would be too high to be passed, where the cliffs at the side would be too sheer and smooth to be climbed, and yet where the current would be too swift to allow any possibility of turning back!

The consciousness of all this fills an entry in Major Powell's diary (August 13th):

"We have an unknown distance yet to run, an unknown river to explore. What falls there are, we know not; what rocks beset the channel, we know not; what walls rise over the river, we know not. Ah, well! we may conjecture many things! The men talk as cheerfully as ever; jests are bandied about freely this morning; but to me the cheer is sombre and the jests are ghastly."

Major Powell's account of the journey, with his scientific observations made on the way, was published by the United States Government at Washington. He wrote a graphic account of the trip for *Scribner's Magazine* (1874), and a popular volume by him, called *The Canyons of the Colorado* was published in 1895, by the Chautauqua Century Press. The volumes in question are full of thrilling adventures.

This is the sort of thing the men of the expedition were continually having to do:

"We land and stop for an hour or two to examine the fall. It seems possible to let down with lines, at least part of the way, from point to point, along the right-hand wall. So we make a portage over the first rocks and find footing on some boulders below. Then we let down one

of the boats to the end of her line, when she reaches a corner of the projecting rock, to which one of the men clings and steadies her while I examine an eddy below. Some of the men take a line of the little boat and let it drift down against another projecting angle. Here is a shelf on which a man from my boat climbs and a shorter line is passed to him and he fastens the boat to the side of the cliff. Then the second one is let down, bringing the line of the third. When the second boat is tied up, the two men standing on the beach above spring into the last boat. Then we let down the boats for twenty-five or thirty yards, by walking along the shelf, landing them again in the mouth of a side canyon. Just below this there is another pile of boulders, over which we make another portage. From the foot of these rocks we can climb to another shelf, forty or fifty feet above the water. On this bench we camp for the night. We find a few sticks which have lodged in the rocks. It is raining hard and we have no shelter, but we kindle a fire and have our supper. We sit on the rocks all night, wrapped in our ponchos, getting what sleep we can."

In order to gain any foothold at all in some parts of the rocky walls, where they absolutely must crawl and lead the

boats, it was many times necessary for one man to brace himself on the deck of a boat and let another, carrying a line, climb upon his shoulders to get the first secure standpoint. Several times they had to explore side cañons in search of fallen trees from which to make new oars—oars were always getting broken against the rocks. Sometimes they climbed far, far up the cliffs and terraces to get from the scrubby piñon trees pitch for re-calking the seams of the boats. Once Major Powell carried a load of pitch down to the boats in his shirt sleeves, which he cut off to form improvised sacks. Another time he reached a shelf on the side of a precipice from which it was impossible to move either up or down. (Major Powell, by the way, had lost his right forearm at Shiloh, but a trifle like that did not lessen his readiness for this sort of scramble!) After much difficulty, one of the other men came to the rescue, doffing his drawers and using their length like a rope to haul the leader up to safety! Over and over different members of the party were washed from their boats or hurled out when a boat capsized.

Powell's second expedition was made in 1871-72 with a party including topographers, photographers, and geologi-

cal experts. The adventures of the second expedition are graphically recounted in Dellenbaugh's *Romance of the Colorado River*, previously referred to, Mr. Dellenbaugh having been personally one of the second exploring party. Its result was the accumulation of a quantity of accurate scientific observations, of great value in any systematic study of the geologic history of the continent. Another result, following close upon these scientific researches, was the awakening of wide and enthusiastic interest in the cañon on the part of the travelling and reading public. Since the publication of Major Powell's reports thousands of other observers have come, some looking into the great gulf with the gaze of the scientist, some with the artist's "inward eye," keen to appreciate the miraculous, overwhelming beauty of it all, in form and light-and-shade and color.

"An inferno, swathed in soft, celestial fires; a whole, chaotic under-world, just emptied of primeval floods and waiting for a new creative word; eluding all sense of perspective or dimension, outstretching the faculty of measurement, overlapping the confines of definite apprehension; a boding, terrible thing, unflinchingly real, yet spectral as a dream."*

* C. A. Higgins.

BOOKS TO READ

For the scientific facts of the region, see :—

J. W. Powell :—*Canyons of the Colorado*.

C. E. Dutton :—*Tertiary History of the Grand Cañon*.

F. S. Dellenbaugh :—*Romance of the Colorado River*.

George Wharton James :—*In and Around the Grand Canyon*.

See also general works like

N. S. Shaler :—*The Story of Our Continent*.

For stories of the exploration of the region, see:

J. W. Powell :—Volume quoted above.

F. S. Dellenbaugh :—Volume quoted above.

George Parker Winship :—*The Journey of Coronado, the First Explorer of the West* (translation of Castañeda).

For specially appreciative comments, see:

Charles Dudley Warner :—*Our Italy*.

Harriet Monroe :—Article in *Atlantic Monthly*, Dec., 1899.

For interesting accounts of Indian life in this region, see:

F. S. Dellenbaugh :—*North Americans of Yesterday*.

G. A. Dorsey :—*Indians of the Southwest*.

George Wharton James :—Volume quoted above, and *Indians of the Painted Desert Region*.

METHODS

Always sit so that a strong, steady light falls on the face of the stereograph. It is a good plan to let the light come from over your shoulder.

Hold the hood of the stereoscope close against the forehead, shutting out all sight of your immediate surroundings.

Move the sliding rack, with the stereograph, along the shaft until you find the distance best suited to your own eyes. This varies greatly with different people.

Read what is said of each place in this book.

Refer to the map and know exactly where you are in each case.

Read the explanatory comments printed on the back of each stereograph mount.

Go slowly. Do not hurry.

Go again—and yet again.

Think it over.

Read all the first-class books and magazine articles that you can find bearing on the subject of the Cañon.

SEEING THE GRAND CAÑON

Eleven hundred miles west of Kansas City the Santa Fé Railroad takes you over the line into Arizona. It is a high, dry, barren land through which the train speeds, yet not vacant but full of interest in its own taciturn, uncompromising fashion. Occasionally you get a hint of what a cañon is like, when the tracks cross the gorge of some vanished river and you look down into the bed where torrents sometime swept and foamed and battled with the ragged rocks that hemmed them in. One such gorge, worth a pause in the journey, you find in Cañon Diablo. It is between Holbrook and Flagstaff. There is an Indian village near the little railway station and at the train itself you are likely to see members of the tribe, dignified and dirty and shrewd at a bargain, ready to sell baskets or blankets, perhaps crude but effectively decorated pottery made by the aboriginal proprietors of this part of the world.

The Cañon itself is worth seeing; some Indian will show you the way to the point marked 1 on Map 1, where you get a

fine view both of the gorge and of the railroad which spans it.

**I. A Wonder to the Primitive Inhabitants
—Santa Fé train crossing Cañon
Diablo.**

You are on the northeast side of the track; that train is going towards Flagstaff, thirty miles away at the west. The cliffs on either side are chiefly of limestone. It is the Arizona "sage brush" that you see growing down here in the trough of the valley, where it gets the benefit of such water as there is.

The bridge up yonder is 540 feet long and 222 feet high where it spans the lowest part of the narrow valley.

It is amazing to see, out here in Arizona, how much can be made out of the slender possibilities of a gulley like this as a help to subsistence. The Navajo and the other Indians here in northeast Arizona somehow manage to keep sheep alive on the scanty grass in cañons like this; they induce corn and beans to grow in such places (the corn is a dwarf kind but of good quality), and so they secure a passable sort of subsistence where all appears to be an almost hopeless desert.*

Two convenient ways of reaching the Grand Cañon are open to the traveller

* G. A. Dorsey: *Indians of the Southwest*.

who comes from Santa Fé (or from the west) by rail. He can leave the train at Flagstaff and go across-country, seventy-three miles, by stage or on horse-back. He can leave the main line at Williams, thirty-six miles farther west on the Santa Fé road, and there change to another train on a spur track, which will take him almost to the rim of the cañon (sixty-five miles). The latter is the easier route, the former the more interesting. Suppose you follow the Flagstaff route.*

The first thirty-five miles of the journey take you past the huge, clustered peaks of the San Francisco mountains, north of town and railroad, and through a great Government reservation of coco-nino pines. Look back at the mountains from one of the lesser heights twenty miles farther toward the north.

2. From Red to San Francisco Mountains—a woody wilderness in sun-kissed Arizona.

You are facing southeast towards the railroad thirty miles away. Cañon Diablo

* There are interesting side-trips that might be made from Flagstaff, *e.g.*, out to Walnut Cañon, eight miles southeast, where there are still standing the stone-built houses of some ancient race, abandoned centuries ago.

is ahead and off at your left, between forty and fifty miles distant.

A few years ago, cattle, horses and sheep were raised in this vicinity, but since the Government appropriated great stretches of land for a national reserve that business has been spoiled. The cattle you see now are only a few stray head strolling up here for water. You are standing now on the lower slope of an extinct volcano, but, curiously enough, the only good spring of water for miles and miles is up here (a little way behind you) in the burnt-out crater where fiery lava used to flow long centuries ago.

A few miles over beyond Slate Mountain—that wooded height at your right—there is just one solitary cabin, fifteen miles from anywhere and anybody, the home of a man who used to be a cattle-raiser. Now he has taken to gold-mining. His log-cabin is not much to look at, but its pioneer hospitality offers the chance traveller a share of whatever the owner has, and a night there makes an interesting experience.

Those snow-streaked mountains are even higher than they look from here. The main summit is fully 6,000 feet, *i. e.*, more than a mile, above the plateau, and the plateau itself is a strong 6,000 feet above the sea-level. The uppermost

peaks (12,750 feet) stand actually as high as many of the splendid giants of the Bernese Alps, and even in midsummer those snow-banks are often a mile long and hundreds of feet wide. The San Francisco group can be seen from a distance of a hundred miles in almost any direction in this part of Arizona. There is a fairly good mountain road now leading up to the summit from Flagstaff, ten miles away. What gives that group yonder peculiar interest for the geologist is the fact that they were once the chimneys of a volcano; those rock ridges that show dark between the hollows filled with everlasting snow are lava-rocks, and at the top the crater sleeps to-day, cold and dead.

But just turn about from this very spot and you can see for yourself the silent, passive form of another volcano—the one from whose slopes you have been looking off. (Find the standpoint, marked 3, on the map.)

3. Blown Asunder by Volcanic Energies; Red Mountain, an Extinct Volcano.

The country all about here bears its dramatic history written on its face. The fiery past of this bit of the earth's surface is something unmistakable—those

curiously shaped, wave-like rocks of reddish-gray are all lava-ash; that steep slope of nearly black sand just at this side of the cliffs is a slippery mass of ancient cinders. The mountain itself is just a bulging bit of the earth's crust, pushed up and then torn open ages ago by tumultuous fiery masses below, and left (when the fires cooled down) all encrusted with ashes and solidified drippings, where Mother Nature's caldron had boiled over. Since the time when this was an active volcano the whole region has been submerged and worn by running water. The queer shapes you see are all partly the effect of the water's action.

It is just ahead at the left, beyond the sage-brush and those trees, where the cattle you lately saw were going for water—all sorts of wild creatures resort there, too—foxes and wolves, antelope, even ponderous bears with feet that leave huge tracks in the muddy ground about the cool spring.

Would you like to see those lava-ridges more clearly? They are curious formations, well worth some study even in this land full of wonders.

You will find standpoint No. 4 also located on the map.

4. Labyrinthine Ways Through the Lava-ash Formation, Red Mountain crater.

There is hardly a place in the world where you can see so plainly as here in northwestern Arizona just how primeval forces worked with fire and with water to make out of a (comparatively) thin-skinned planet the world that we know. Over at the Cañon you will see the mighty work of water, wind and weather. Here you see all around you towering walls and piles of stuff that must have been at inconceivably furious heat when it was blown out of the crater's mouth in some frightful explosion of far, far-off ages. Its material is that of the inner core of the earth, torn into fine bits by the rage of superheated steam or imprisoned gases, the moment that an outlet was gained into upper air, and afterwards compressed into the form of rather porous rock, by the accumulation of its own mass.

You could wander and clamber about here for hours among these weird walls and towers. One extraordinary fact about the place is the way in which the porous walls deaden sounds—they seem to absorb and destroy such vibrations. Two people at opposite sides of one of these thirty-foot screens could not shout

loud enough to make themselves heard by each other.

But now for the Cañon itself, twenty miles away.

The approach to almost any one of the best-known points on the southern rim gives you practically no hint of what you are about to see. You walk forward—and suddenly you can move no farther. You have reached the end of the world!

5. "The Sinuous Colorado, Yellow as the Tiber," North from Bissell's Point.*

You see about forty miles up-river; that farther horizon is a part of the famous Painted Desert.

Distances and dimensions baffle the judgment here. It takes time to adjust the imagination to the gigantic scale on which nature has worked. You see those sculptured buttes over on the northwest side of the river—if the San Francisco mountains could be plucked up from the plateau behind you and set here in their place you would know the difference only by their shape; the summits would hardly reach the level of the bank where you stand. If Niagara were pouring down

* You will find this exact spot marked on the map, the red V lines showing the area over which you look.

over one of those terraces you would have to search with a good field-glass to find it. You could hardly believe it any more than a mountain brook. The Cañon of the Yellowstone and famous Yosemite Valley, grand as they are in their own corners of the earth, would here be lost in a multitude of cañons and valleys far bigger and deeper and longer.

The color that envelops all this overwhelming grandeur is something in itself as marvellous as the rock-sculpture. The cliffs over yonder are grayish-white, yellow, pink, dull red; the shadows take on the most beautiful, softly glowing hues of amethyst and violet and purple. On some of those more gently sloping terraces, where débris from the cliffs above have given vegetation a chance to start, you get the green of scrubby piñon trees, like these just below your feet, and the smoky, dusty green of sage-brush, yucca, cactus and such forms of plant-life as have the courage to start here. The gorgeously magnificent effect of the whole is something that cannot be described but can be imagined.

Turn once more to the map, and you will see dotted lines marking the course of the old Red Cañon trail downward from a place on the rim a little south of Bis-

sel's Point. Part way down that trail you find a point marked 6, from which diverging lines reach out to the rim at the northwest. Notice particularly that the red lines end at the opposite rim—they show that you see just to the farther brink of the river, but that only the sides of the cañon can possibly be in sight—nothing beyond nor above.

6. Among the Buttes, Red Canon Trail.

Is it not a surprise to find how abruptly the rocks make a straight, sheer descent below your feet to that sloping terrace? The horse is a sure-footed beast and can be trusted to take care of himself even on the edge of that dizzy shelf where he waits for his mistress. It is a tempting and yet baffling opportunity for anybody who ever tries to sketch landscape effects. Some of Thomas Moran's best work about the cañon was done at a point just behind and above you (half a mile overhead!) on the rim.

You understand, of course, that this is only a comparatively short distance down into the cañon's depth—perhaps 2,000 feet below the brink, though the trail, doubling and twisting and winding and zigzagging, covered several miles in order to reach even this point. It makes a

ten-mile journey between the rim and the river a mile below the rim! That ominous, dark hollow beyond the sunny edge of the terrace down there is the opening of the lower gorge. Below that edge of the terrace the cliffs go down almost straight a half mile towards the heart of the earth, before they wall in the river as it rushes by towards the southwest (left).

Now return to the normal level and move still a little farther west to the place on the rim which the map calls Hance's Cove. It is named for Captain John Hance, the veteran guide to the Cañon; he came here in 1883 on a prospecting tour, and was so impressed by the awful beauty of the place that he has never gone away, but lives here yet with his cattle and his favorite pipe and his dreams about gold mines of inconceivable richness down somewhere in the bed of the river below. Every fall he goes down into the cañon to spend the winter; he descends about 6,000 feet to a point where the cattle can live on the terrace growth of sage-brush, and there he pitches a tent and lives with the winds and the snows and the raging waters for company.

• The ground near the rim slopes up-

ward toward the very brink at this point, so it happens again that, a few rods away from the edge, you see not the slightest intimation of the presence of any gorge. Looking from Hance's cabin, for instance, there is no sign of the proximity of any great sight, for a gentle rise in the ground cuts off every distant view. But when you climb that rise of ground this is what bursts upon your sight :

7. Fathoming the Depths of a Vanished Sea—Grand Cañon of Arizona from Hance's Cove.*

The stream you see down below is only a tributary of the Colorado ; this nearest gorge, mighty as it yawns under your feet, is only one of a hundred side cañons. The Colorado itself is flowing by, beyond these buttes at the right, and beyond where that nearly level terrace stands out in a projecting point above the farther reach of the creek.

A glimpse like this, where you see a cañon wall in profile, helps a good deal towards realizing the stupendous facts of those titanic rock-sculptures you see over opposite. You observe how the river channel has gradually narrowed as it

* Be sure to refer again to the map in order to have your standpoint and range of view clearly and accurately in mind.

deepened, the upper banks being worn away by wind and frost and pouring rain even after the river had gone off and left them, so that the space between the banks grew wider and wider with time. That magnificent butte over in the north side of the river (Vishnu Temple) is really some distance this side of—as well as below—the rim. It is part of one of the ancient terraces which for some reason stood the waters' wear and tear more obstinately than the neighboring rock.

You can see very plainly in this side cañon the stratification of the rocks whose material was first deposited as mud in an ocean bed, then compressed into solid rock, and later pushed up out of the sea to meet the grinding cut of the old outlet of the vanished inland sea.*

The glimpses of the river that one gets from the rim are tantalizing. To see a river a mile away, and know one will have to travel perhaps ten miles to reach it, gives the stream a certain unique fascination. A number of trails, more or less good, have been cleared and built at different parts of the Cañon on this side; there used to be one leading down from Hance's Cove, but it has been so washed by storms as to be nearly impassable. One of the favorites at present is the

* See introductory chapter.

“Grand View.” Now take your stand on that trail, where you see the encircled 8 on the map. You will meet other travellers coming down the steep path over the broken ledges.

8. Descending Grand View Trail.

It makes one feel like hugging the wall on the left! The rim is some twelve hundred feet above your head (over twice the height of the Washington Monument), and yet the river is more than three-quarters of a mile still farther down, down, down, in the depths of this chasm. Mile after mile of travelling like this you would have to do before you would actually reach its waters. What looks like the bottom of the Cañon away down there, dotted with sage brush and scrubby little trees, is only one of the terraces, a somewhat broader shelf on the side of the bank, such a formation as you saw in profile on the buttes when you looked down from Hance's Cove (Stereograph 7). It is about 2,000 feet below the rim.

(Be sure to notice how the divergent lines run on the map. Observe how they indicate the way in which your outlook here is cut off at the left by this cañon wall and how at the right you see away

off across the whole width of the cañon.)

That picturesque tree is one of the piñons that make themselves so much at home in odd corners of the vast chasm. It was from trees of this sort that Powell gathered pitch to calk his boats during that first daring voyage of exploration.

Until the branch railway was built from Williams up to the point opposite Bright Angel Creek, this was *the* trail most visited by tourists. It is still one of the most interesting of all the trails, for open terraces like the one down below give good opportunities to look up and down the cañon. Part way down there is a copper mine, not completely developed.

These tough little burros are carrying more than the usual amount of baggage, for they belong to a camping party. The blankets and provisions cinched on their sturdy backs will provide not exactly luxury but a very satisfactory sort of comfort for anybody who enjoys adventurous scrambles, and who can sleep with a blanket for a pillow and the starlit sky for a roof. The reins left trailing on the ground from that first animal's head are practically orders for him to stand still and wait. That is a traditional part of the technical training of horses out here in the southwest.

These are sure-footed little beasts, pretty nearly as agile as goats in climbing up and down this crooked trail—in places as steep as a narrow flight of old-fashioned stairs. Many a time a horseman going over this path finds the head and shoulders of his steed away out over the edge of the cliff, so that he himself can (if his own head is strong enough) look down a thousand feet through absolutely open space! Sometimes accidents do almost happen. Before this very camping party reached the river one of the horses did somehow slip on one of the steepest and most dangerous “ladders;” the chronicler said afterwards: “. . . The best horse carrying the best woman in the world, fell headlong and came near rolling over the precipice. With the agility of a feline the lady leaped from the saddle and saved herself and the horse. . . . Oh, yes, it was a breathless moment for the writer, who had no wish to be a widower!”

Away down below that terrace yonder, this same trail takes you near some curious caves discovered in 1897 by a member of another camping-party. You leave your horse on the trail and scramble up a steep slope of limestone. After a few rods progress inside the cavern all is black darkness—you see nothing at all.

Then, if you have apparatus for producing a flashlight—behold! This is what the light discloses:

9. Dendritic Stalagmites in a Limestone Cave.

All these exquisite shapes have, you understand, been formed by the slow drip, drip, dripping of water heavily charged with lime; the water long ago evaporated, leaving behind this mineral stuff which it had held in solution.

That opening ahead is, perhaps, eight or ten feet high; you could follow the queer, hollow corridor on and on for nearly an eighth of a mile into the heart of the cliff. There is another cavern much like it not far away.

Again the trail leads down, down, and farther down. Below the limestone caves is another terrace—a broad, irregular shelf of rock; a good deal like the one on which you gazed from that dizzy perch where the burros were descending (Stereograph 8). Down on the lower plateau there is a famous spring—famous partly because the water is really good and abundant, and partly because it is the only spring for miles and miles. Find the tenth standpoint on the map. You

will find the divergent red lines promise you a long outlook off toward the left, though the outlook at the right appears to be cut off by some obstacle.

10. Angels' Gateway and Newberry Terrace from Cottonwood Spring.

You remember you are facing nearly north. It seems as if those towering heights must be mountain walls, but you know the fact is that they are only parts of the river banks; though the vertical distances you see are so enormous, almost overwhelming in their dignified grandeur, yet even now you do not see quite up to the rim, and you see by no means down to the bed of the river. The Colorado is more than 1,200 feet below this plateau where you stand now!

The enormous heights and depths of this place grow upon the mind by degrees. At first they are too vast for belief. After a while you become gradually able to realize the meaning of statistical facts and figures.

Quite the opposite of modern statistical interpretation is the old Pi-Ute tradition about that Gateway. This is the story as Major Powell heard it years ago:

“Long ago there was a great and wise chief who mourned the death of his wife,

and would not be comforted till Ta-vwoats, one of the Indian gods, came to him and told him she was in a happier land, and offered to take him there that he might see her himself, if upon his return he would cease to mourn. The great chief promised. Then Ta-vwoats made a trail through the mountains that intervene between that beautiful land, the balmy region in the Great West, and this the desert home of the poor Nu-ma. This trail was the cañon gorge of the Colorado. Through it he led him, and, when they had returned, the deity exacted from the chief a promise that he would tell no one of the joys of that land, lest through discontent with the circumstances of this world, they should desire to go to heaven. Then he rolled a river into the gorge, a mad, raging stream, that should engulf any that might attempt to enter thereby."

Pi-Ute tradition says that sometime the high gods (Those Above) will return to take all the Indian people into the blessed regions, and that when they do come they will appear through that gateway!

The trail oftenest followed down by tourists is the "Bright Angel," named, like the hotel, for a creek entering the Colorado at that point in its course,

through a cañon over on the opposite (north) side. The creek was named by Powell's exploring party in enthusiastic appreciation of the quality of the water, enthusiasm made the heartier because of a previous disappointment when one of the men had described a certain other tributary as a "dirty devil."

The descent of the Bright Angel trail is, in general terms, much like that of the Grand View—similar steep inclines and overhanging cliffs, where your head begins to whirl, and perilous curves and zigzags. When you do finally reach the river, after miles on miles of rough, hard travelling, it is hard to realize from what you see that you are actually so far down in the great chasm.

Find standpoint 11 on the map. You see it is close by the water's edge. Notice that the limited reach of the V lines shows that you cannot see quite up to the rim—the intervening buttes and terraces cut off a longer view. (If you turn back for a moment, say, to standpoint 5, you will readily understand how a person away down at the water's edge might not be able to see anywhere near up to the actual rim, because the lower cliffs and buttes so closely shut him in.)

11. Beside the Colorado; looking up to Zoroaster Tower from Pipe Creek.

Your outlook is northeast over this sharp bend in the river. What the depth of the stream may be at this point one can only conjecture. The boulders, stones and gravel that you see alongside the stream are fragments torn from the cliffs by which the river has swept, or bits torn from the heights above by rending frost and pouring, driving rain. Imagine the sudden fierceness with which the waters of a heavy rain would pour down into the river here! Almost every drop falling within the area between the widely separated rims must quite soon reach this hurrying stream, for the walls, you remember, are almost all impenetrable rock; the only absorbent soil is the thin coating on the terraces. In May and June, when the snows are fast melting on the Rockies, the river rises to its height; the freshets then are something tremendous.

Zoroaster Tower is that most conspicuous butte standing up against the sky from the northern wall. A good many of the buttes, you notice, have Oriental names; their outlandish beauty of form so strongly suggests the conception of the old Eastern architects that such names were given almost instinctively by early

explorers who appreciated their peculiar kind of beauty.

Down past these very walls and fantastic rock towers, round this very bend in the river, the men of Powell's first expedition came in 1869. Some of their most exciting adventures were met farther up stream, before they reached this particular point, but even here there was ominous mystery hanging over the way. As they came around that very turn in the stream, they could not know but what some new danger might prove impossible to avoid, impossible to surmount.

And to think of the journey these waters themselves have made! Some part of this raging, impetuous flood has come away down from the Wind River Mountains in Wyoming. Some part of the waters that you see now torn into filmy bubbles by ugly rocks underneath may once have been borne by the wind in fleecy white clouds over the wide reaches of Yellowstone Park, and dropped in the form of rain on the giant slope of Fremont's Peak, six hundred miles away from this scene of noisy haste and turmoil.

The river here is perhaps a couple of hundred feet wide. It is an interesting experience to look at it from different

heights, watching it take the look of a smaller and smaller stream as you go higher and higher on your way back up to terra-firma.

See, for instance, how it narrows to the look of a mere creek when you are only twelve hundred feet above the water—considerably *less than a quarter of the way up to the rim.*

12. Down the Granite Gorge of the Colorado (1,200 feet deep), from Pyrites Point.

(Find this location on the map. It is marked 12.)

Here you have a chance to see very plainly the difference between the primeval granite that walls in this gorge below and the stratified rocks which overlies and enwrap the granite core on the outside. What you see before your very eyes shows, as no amount of written description could show, the different ways in which running water affected the upper layers (which were really compressed and compacted masses of what had once been gravel, sand and mud), and this lower mass of the original core of the earth.

Returning to the Bright Angel trail, your guides will probably tell you of

alluring "finds" of gold in this part of the Cañon. Captain Hance, the veteran among Cañon guides, has devout, though perhaps not well grounded, faith in the existence of immense gold beds in the vicinity, but they would have to be beds rich almost beyond men's dreams to make their development pay, the expense of transporting apparatus and supplies would be so enormous. The finds so far made have not been fully developed. And yet, the gold-fever is hard to cure when it gets into one's veins; any man who once catches it always has his eyes open and his hammer ready. See, for instance, how a man at work on the construction of the trail manages to keep a sharp tally on every possible indication of the presence of the precious stuff.

13. Prospecting for Gold—Indian Garden Creek.

This spot is located like all the others, on the map. The conspicuous butte in the distance is the Buddha.

The load carried by this little burro means "all the comforts of home" to a prospector. Hot coffee, fried bacon and frying-pan bread make a meal more tempting than those of the Waldorf-Astoria, if your appetite has been sharp-

ened by long hours of climbing over the rocks in this clear Arizona air.

The way down is dizzy and hard; the way up brings new impressions and new experiences. One of the bewildering things about the upward climb is the fashion in which the trail ahead often hides from your view, almost making you think that there is no trail—that it has vanished by some bewitchment of this eerie place and left you a helpless prisoner at the foot of insurmountable prison walls! One such place they call “Cape Horn.” There has been a narrow (Oh, so narrow!) shelf along which to pick your way with careful steps, but just ahead a huge, rough promontory juts out from the rest of the cliff, and seems positively to cut your path quite off, with its grim announcement of *No passing*. It really does look as if the trail ended there in despair, and as if you might just as well sit down on the edge of the cliff and wait for your end.

But, no! You do not give up and sit down on the edge of the cliff; you move on, and on; the shelf obligingly does continue under your feet, and, when you reach the threatening, bulging brow of that forbidding bulk, the trail just swings itself around by a sharp curve to the

other side, and you see steps and hope ahead!

14. Rounding Cape Horn on the Bright Angel Trail.*

You can see the steps or "ladder" this minute—hardly the place for an ordinary horse, but these animals have been over this same trail many times and have nearly as good judgment as their masters with regard to how to do it.

Cliffs like these—sometimes even steeper—Powell and his men climbed every now and then, fastening their boats far below, and scaling the jutting crags, in order to look off up and down the stream, and so get a sense of the place as one inclusive whole. Fancy such a climb in an absolutely trackless, unknown solitude.

The location of the hotel for tourists opposite the side cañon of Bright Angel Creek was a wise choice. The views from the rim close by the Bright Angel hotel are wonderfully beautiful, and show the characteristic aspects of the incredible gorge in a particularly dramatic way.

Take a look now north-northeast across from a point on the rim close by the hotel. It is from this part of the rim that most

* This spot is located at 14 on the map.

tourists nowadays get their first impressions of the Cañon as a whole. Standpoint 15 (so marked on the map) is the exact spot from which you are to look. It is a favorite resort of the famous painter Thomas Moran; you have, indeed, a chance to see him here with one of his sketch-books in hand.

15. Thomas Moran, America's greatest scenic artist, sketching at Bright Angel Cove.

You see now in close detail the extraordinary, terraced architecture of one of the beautiful buttes. It seems a wonder that those tough little piñon trees can find enough earth to grow in; they can, of course, have no water except what falls directly on that narrowed summit from showers passing over this arid land, yet they grow and thrive.

That long, tapering trough over on the opposite side of the river, made by those deep shadows grotesquely like some great dragon, is the cañon of Bright Angel Creek. Pipe Creek, from whose mouth you looked up and across to Zoroaster Tower (Stereograph 11) enters the river almost opposite the "Bright Angel," from this (south) side of the stream.

Seeing the Cañon in this way, and especially with this afternoon light making the hollow of Bright Angel Cañon so significantly conspicuous, Dellenbaugh's picturesque interpretation of the topography is especially full of meaning. Refer right here to the quotation on page 14 from his *Romance of the Colorado River*: "The Grand Cañon may be likened to an inverted mountain range. Imagine a great mountain chain cast upside down in plaster," etc., etc.

Charles Dudley Warner was one of the first writers who attempted to tell people what all this was like. The Grand Cañon chapters in his volume called *Our Italy* are well worth reading.

"I was continually likening this," he says, "to a vast city rather than a landscape, but it was a city of no man's creation nor of any man's conception. In the visions which inspired or crazy painters have had of the New Jerusalem, of Babylon the Great, of a heaven in the atmosphere with endless perspective of towers and steeps that hang in the twilight sky, the imagination has tried to reach this reality. But here are effects beyond the artist, this great space is filled with gigantic architectural constructions, with amphitheatres, gorges, precipices, walls of masonry, fortresses terraced up

to the level of the eye, temples, mountain-size, all brilliant with horizontal lines of color, streaks of solid hues a few feet in width—yellows, mingled white and gray, orange, dull red, brown, blue, carmine, green, all blending in the sunlight into one transcendant suffusion of splendor.”

Seeing the Cañon through stereographs, you must needs use not only your actual physical eyes but the eyes of your imagination, in order to appreciate the color effects which are so marvellous a part of its unspeakable splendor. The color glories of the place are, perhaps, especially wonderful near sunset, when the sunlight, striking almost horizontally through the lower strata of the earth's atmosphere, seems to turn all the air into a softly glorified haze shot through and through with melting hues. (Take standpoint 16 as marked on the map.)

16. “Over All Broods a Solemn Silence” —Sunset at O'Neill's Point.

One man who looked upon a sight like this wrote about it: “The vision of the Cañon at sunset is one of the marvels. All its colors are intensified, and the reds and yellows burn like coals. When the low sun gilds the red sandstone masses, oceans of rose-flame sweep up the walls,

more and more brilliant as they climb, until the topmost thousand feet of the farther rim blaze with the fire of hyacinth, ruby and garnet. The splendor rises and fades and is caught by the vapors overhead." *

One of the grandest, broadest outlooks across the Cañon can be had from Rowe's Point a little farther down river (west). You do not see from that part of the rim away down to the very waters of the river, the depth is too great and the intervening buttes of ragged rock stand up across the line of vision; but the terrific suddenness of the walls' descent makes you, even when you think yourself accustomed to such things, catch your breath with amazement and awe.

17. Overlooking Nature's Grandest Amphitheatre—from Rowe's Point to Point Sublime

That great, square-topped headland opposite is Point Sublime. You see beyond it the broad opening of the side cañon where Shinumo Creek brings tributary waters down to the river. Point Sublime is the same headland that you looked at through the veil of sun-filled haze from O'Neill's Point. See the location on the map. (Stereograph 16.)

* C. M. Skinner in the *Brooklyn Eagle*.

It takes "nerve" to sit in that non-chalant fashion with over a thousand feet of empty space between your swinging heels and the ground below! The Indians of this region, imaginative as they all are, and ingenious in the planning of hideous terrors for a hated enemy, used in old times to put an end to captives by swinging them off from a cliff a good deal like this one (Apache Point), farther down the river on this side. George Wharton James, who has spent years in intimate, friendly association with the Havasupai, the Indians of Havasupai Cañon, just off at the west, learned from them about the horribly dramatic custom of the tribe. The Apaches were for centuries their enemies and many times descended upon the Havasu villages, spreading destruction and murder in their path. If the Havasupai were able to rally and lucky enough to capture their invaders, a fearful vengeance was taken.

"One method of killing them was to bring them out to Apache Point where there is a frightful precipice, and there, one man holding the prisoner by the hair and the other by his feet, calling upon all the evil powers that are supposed to lurk in and about Chic-a-mi-mi Hack-a-tai-a (the Grand Cañon), the unhappy wretch was swung to and fro over that awful

precipice; then, with a wild yell of triumph, giving him a fierce swing outward, both captors loosed their hold on the wretched Apache." *

But those days of horror are over; no gruesome tragedies stain the Cañon walls to-day. Its message to men is one of awful splendor, of solemn glory, but not of terror. All men may peer into the vast, mysterious deeps with the fearless gaze of trustful children.

18. On the Brink, one mile above the river;—northwest from Rowe's Point.

Be sure to identify this standpoint as well as all the rest. The map shows that you are facing somewhat north of west. Just below the dangling feet of these little folks yawns the opening of one of the smaller side cañons; over beyond its farther wall you have your last look at the river flowing west-northwest in its devious onward way to the Gulf of California. Those waters you see far down below have been past Bissell's Point (Stereograph 5); they have swept by the granite base of the gigantic pedestal of Zoroaster Tower (Stereograph 11); they have gone tearing like mad through the narrow

* George Wharton James: *In and Around the Grand Cañon.*

granite gorge below Pyrites Point (Stereograph 12). Still their Herculean task is not ended. Farther yet stretch out the long reaches of jagged walls and ferocious cliffs that are still to be passed.

You are looking now altogether *into* the Cañon, not directing your gaze high enough to see an inch of sky above the bounding rim. Again you can trace the layers of stratified rocks, telling of history so far back that it staggers the imagination. Again you see where the pitiless river has laid bare the inner substance of the earth's crust.

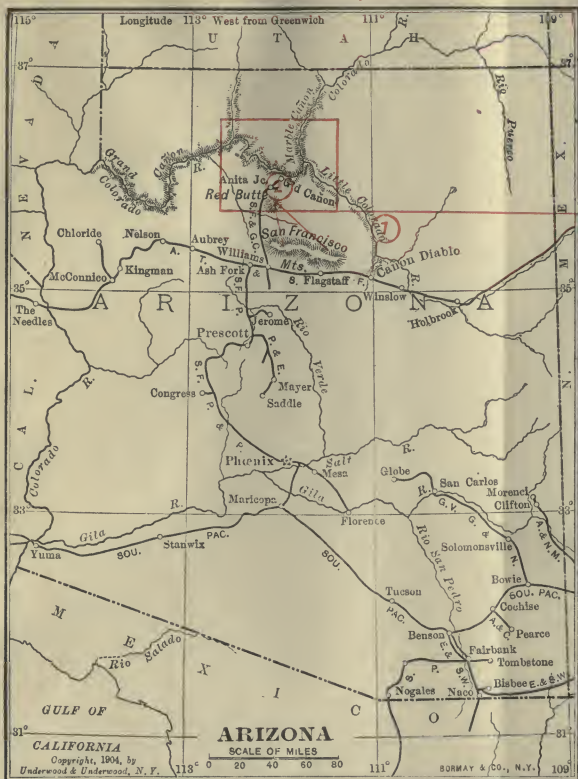
And yet after all, the river speaks here not entirely of the past. It speaks of the future, too. Those waters you see yonder are continuing the work of their ancestral predecessors, but at the same time they are on their way to begin a new career. Outside these prison walls, away off down at the shore of the Gulf of California, they will find their freedom under new skies and new winds. And who knows what winds may woo them from the sea and take them sailing in misty cloud? Who knows where they may go, or on what new mission in world-making, after once they reach the end of this strange journey, when once they find the goal that Nature's inexorable law bids them seek, the Pacific Ocean, the vast Sea of Peace?

They are so realistic and natural that one feels as if he were beholding the actual scenery; so realistic is the scene made that he obtains the inspiration which actual sight gives.—The Hon. JOHN L. BATES, *Governor of Massachusetts.*

The emotions awakened are the same as those aroused by looking at the actual scene, differing only in intensity and quantity from those gained on the spot. . . . The mind retains a consciousness of having actually seen the places examined rather than of having studied a photograph.—*Zion's Herald.*

I have recently gone through a series of stereographs of Rome with maps and book, and although I never have actually visited Rome, nevertheless, I feel that I secured genuine experiences of being in Rome, which were as "real" as the experiences obtained in places where I have actually been.—JAMES E. LOUGH, PH.D., *Professor of Experimental Psychology, New York University.*

GRAND CANYON TOUR, MAP NO. 1



Patented U. S. A., August 21, 1900.

Patented France, March 26, 1900. S. G. D. G.


Patented Great Britain, March 22, 1900.


Switzerland,  Patent Nr. 21,211

EXPLANATIONS OF MAP SYSTEM.

(1). The red lines on this map mark out the territory shown in the respective stereographs.

(2). The numbers in circles refer to stereographs correspondingly numbered.

(3). The apex  or point from which two lines branch out, indicates the place from which the view was taken, viz., the place from which we look out, in the stereograph, over the territory between the two lines.

(4). The branching lines  indicate the limits of the stereographed scene, viz., the limits of our vision on the right and left when looking at the stereograph.





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